CLAIMS

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

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1. A method of treating a region of skin comprising the steps of applying pulsed light, heating collagen and shrinking the collagen, thereby reviving the elasticity of the collagen and of the skin.

2. The method of claim 1, further comprising the step of protecting the epidermis and outer layers of the skin by cooling the epidermis and outer layers of the skin.

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3. The method of claim 2 wherein the step of cooling includes the step of applying a transparent substance having a temperature less than an ambient temperature, to the region of skin.

4. The method of claim 3 further including the step of controlling a delay time between the application of the substance and the application of light, to control a temperature distribution within the skin.

5. The method of claim 3 wherein the substance is ice.

6. The method of claim 3 wherein the substance is a gel.

15. The method of claim 14 further including the step of controlling the radiation spectrum by filtering the light to control a temperature distribution within the skin.

16. The method of claim 15 further including the steps of controlling a pulse duration and applying multiple pulses to control a temperature distribution within the skin.

17. The method of claim 1 wherein the step of applying pulsed light includes the step of applying light having a wavelength in the range of 600-1200nm.

18. The method of claim 1 further including the step of directing the light to the skin using a flexible light guide.

19. The method of claim 1 further including the step of directing the light to the skin using a rigid light guide.

20. A method of generating a temperature distribution inside a region of skin having a maximum temperature at a selected depth comprising the steps of cooling the epidermis and outer layers of the region of skin and applying pulsed light to the region of skin.

21. The method of claim 20 wherein the step of cooling includes the step of applying a transparent substance having a temperature less than an ambient temperature, to the region of skin.

28. The apparatus of claim 25 wherein the pulsed light source includes a microprocessor for determining the delay time in response to a selected collagen heating depth.

29. The apparatus of claim 26 including means for reducing the temperature of the cooling substance, wherein the cooling means is disposed to provide a signal indicative of cooling to the timer.

30. The apparatus of claim 25 wherein the pulsed light further includes a pulse formation circuit and a pulse duration input, wherein the pulse duration circuit controls the duration of pulses in response to the pulse duration input.

31. The apparatus of claim 25 wherein the pulsed light source includes a laser.

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32. The apparatus of claim 31 wherein the laser is a Nd(Yag) laser.

33. The apparatus of claim 31 wherein the laser is a ruby laser.

34. The apparatus of claim 25 wherein the pulsed light source includes a noncoherent light source.

35. The apparatus of claim 25 further including a filter disposed adjacent to the aperture, wherein a temperature distribution within the skin is controlled in response to a radiation spectrum produced by filtering the light.

36. The apparatus of claim 35 wherein the filter is of the type that does not eliminate light having a wavelength in the range of 600-1200nm.

37. The apparatus of claim 25 further including a flexible light guide attached adjacent to the aperture.

38. The apparatus of claim 25 further including a rigid light guide attached adjacent to the aperture.

39. A method of cutaneous resurfacing of a region of skin comprising the steps of producing Er:YAG laser light, and directing the light to the region of skin.

40. The method of claim 39, wherein the step of producing includes the step of pulsing the laser light.

41. The method of claim 40, wherein the step of pulsing includes the step of delaying in the range of 0.5-10msec between pulses.

42. The method of claim 40, wherein the step of pulsing includes the step of providing pulses having energy fluences on the order of 100J/cm^2.

43. An apparatus of cutaneous resurfacing of a region of skin comprising an Er:YAG laser light source disposed in a housing capable of directing light to the region of skin.

44. The apparatus of claim 43, wherein the laser light includes a pulse forming circuit.

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45. The apparatus of claim 44, wherein the pulse forming circuit includes a pulse delay circuit for producing a delay in the range of 0.5-10msec between pulses.

46. The apparatus of claim 43, wherein the light source is capable of providing pulses having energy fluences on the order of 100J/cm^2.

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47. An apparatus for the cutaneous resurfacing of a region of skin, including skin resurfacing or wrinkle smoothing, which comprises: an incoherent light source such as a flashlamp; an Er:YAG laser which can be operated in multiple pulse mode; a delivery system disposed to deliver the incoherent light and laser light to the region.

Add c1

Sub a3

7. The method of claim 2 wherein the step of cooling includes the step of applying a transparent substance to the region of skin and reducing the temperature of the substance.

8. The method of claim 7 wherein the substance is ice.

9. The method of claim 7 wherein the substance is a gel.

10. The method of claim 2 further including the steps of controlling a pulse duration and applying multiple pulses to control a temperature distribution within the skin.

11. The method of claim 1 wherein the step of applying pulsed light includes the step of pulsing a laser.

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12. The method of claim 11 wherein the step of pulsing a laser includes the step of pulsing a Nd(Yag) laser.

13. The method of claim 11 wherein the step of pulsing a laser includes the step of pulsing a ruby laser.

14. The method of claim 1 wherein the step of applying pulsed light includes the step of pulsing a noncoherent light source.

22. The method of claim 21 further including the step of controlling a delay time between the application of the substance and the application of light, to control the temperature distribution.

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23. The method of claim 20 wherein the step of cooling includes the step of applying a transparent substance to the region of skin and reducing the temperature of the substance.

24. The method of claim 20 further including the steps of controlling a pulse duration and applying multiple pulses.

25. An apparatus for treating a region of skin comprising a pulsed light source capable of heating collagen and shrinking the collagen, thereby reviving the elasticity of the collagen and of the skin, a housing, in which the light source is disposed, wherein the housing includes an aperture suitable for directing the light to the region of skin.

26. The apparatus of claim 25 further including a timer, connected to the pulsed light source, for indicating when a delay time has passes after an application of a cooling substance to the skin region.

27. The apparatus of claim 25 wherein the pulsed light source includes a microprocessor for determining the delay time in response to a selected skin temperature profile.